INTEGRATED CIRCUIT CAPABLE OF WORKING WITH

MULTIPLE BUS INTERFACE STANDARDS

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5   BACKGROUND

The present invention relates to an interface circuit conforming to multiple bus

standards.

The spiraling performance of computers have been achieved in part through high

performance peripheral devices such as video graphics adapters, local area network

10   interfaces, SCSI bus adapters, full motion video, redundant error checking and correcting

disk arrays, and the like that communicate over high speed expansion local buses.

Desktop computers (and servers) are usually constructed differently from mobile

computers in that more of their constituent subsystems are provided through add-in

boards and/or add-on devices outside the system motherboard. This arrangement makes it

15   easy to tailor the system's capabilities by mixing and matching a specific set of desired

functions. This customizing capability allows desktop PC vendors to differentiate their

products from those of other manufacturers, as well as allowing users to fine-tune a

standard-model desktop to their particular functional needs. Virtually all computers

communicate with peripherals through a high speed expansion local bus standard called

20   the "Peripheral Component Interconnect" or PCI bus. A more complete definition of the

PCI local bus may be found in the PCI Local Bus Specification, revision 2.1; PCI/PCI

Bridge Specification, revision 1.0; PCI System Design Guide, revision 1.0; and PCI

BIOS Specification, revision 2.1, the disclosures of which are hereby incorporated by

reference. These PCI specifications are available from the PCI Special Interest Group, P.O. Box 14070, Portland, Oregon 97214.

Mobile platform customization is more difficult than in a desktop, because of the integration of many system components into the (pre-determined) system configuration.

5   Some means is needed to augment or perhaps replace the basic platform's components; that is, an add-in or add-on capability is needed. For mobile computers, the PCMCIA (Personal Computer Memory Card International Association) has specified a bus standard called a PC-Card standard that provides an I/O interface for a 68 pin connector initially used for memory cards. Variations of the PCMCIA bus include the CardBus and Zoomed

10   Video Specifications. The connector supports a 32-bit address/data path, which provides the same high performance levels as the host platform's internal PCI system bus. CardBus provides a 32-bit multiplexed address/data path, which operates at PCI local-bus speeds of up to 33 MHz, yielding a peak band-width of 132MB/sec. CardBus accomplishes this by adopting the synchronous burst-transfer orientation of PCI, as well as a bus protocol

15   which is essentially identical to that of PCI. CardBus also shares the PCI software standardization namely header files used in hardware configuration at boot time and/or dynamically during run-time hardware usage. CardBus devices can be power managed similarly to PCI devices through BIOS and power management interfaces at the card and socket services level. While CardBus is derived from PCI, it may be implemented on any

20   32-bit system that provides functionality similar to that provided by PCI. Although it is not the same as PCI in all respects, the signaling protocols are identical. These similarities make it especially easy to link CardBus with PCI, although CardBus is also usable with other system busses.

Traditionally, an add-on card such as a PCI card or a CardBus card contains one or more bus interface integrated circuits (ICs) and one or more ICs that provide the functionality specified for the add-on card. Due to voltage differences between PCI and PCMCIA cards, multiple versions of bus interface ICs need to be designed, inventoried, and supported. To illustrate, to manufacture a PCI compatible add-on card, PCI compatible bus interface ICs are used. To make a CardBus version of the same add-on card, PCI compatible interface ICs are substituted with CardBus compatible bus interface ICs. The output of the bus interface ICs are provided to other ICs that provide the functionality of the add-on board, for instance modem ICs for modem cards, graphic ICs for display adapter boards, and local area network ICs for networking cards.

SUMMARY

An interface circuit that conforms to multiple bus standards includes a first interface circuit conforming to a first bus standard; a second interface circuit conforming to a second bus standard; and a common set of pins coupled to the first interface circuit and the second interface circuit, the common set of pins being user selectable to communicate with a host computer bus in accordance with either the first bus standard or the second bus standard.

Advantages of the above system may include one or more of the following. The circuit shares the pins of an IC to be field programmed to use a common set of pins to both transmit and receive data conforming to either the PCI bus standard or the PCMCIA bus standard. The system addresses issues such as miniaturization, chip count, and cost. Based on a programmable chip setting, each bus interface pin can be used to communicate over a plurality of bus interface definitions such as PCI and PCMCIA bus definitions. One interface IC can be used to handle multiple bus standards. For example, one IC can handle either the PCI interface or the PCMCIA interface to avoid the need to keep two versions of the same IC in inventory. This reduces pin count and chip count, thus minimizing required board space and manufacturing cost. Moreover, since separate interface circuits are no longer needed to handle differing voltages, the functionality of an add-on board can be integrated onto a single chip, thus further driving down cost for the resulting product. The system provides designers with an opportunity to lower chip counts, and thus reduce board space and cost, by replacing groups of discrete logical devices with a single chip.